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First Computed Tomography Evidence of Pulmonary Cavitated Lipoma: Diagnosis and Management

Tullio Valente[1] Giorgio Bocchini[1] Gaetano Rea[1] Marianna Paccone[1] Giuseppe Vitale[1] Giacomo Sica[1]

[1] Section of General Radiology, Department of Diagnostic Imaging, Azienda dei Colli, Monaldi Hospital, Naples, Italy

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Address for correspondence Giacomo Sica, MD, PhD, Section of General Radiology, Department of Diagnostic Imaging, Section of General Radiology, Azienda Ospedali dei Colli, Monaldi Hospital, 80131 Naples, Italy (e-mail: gsica@sirm.org).

Abstract

Lipomas are the most common form of benign soft tissue tumors in humans, occurring infrequently in visceral organs. Pulmonary lipomas are seen rarely and can occur such as an endobronchial (80%) or peripheral parenchymal (20%) lesion. Less than 10 cases of lung peripheral lipoma are described in literature, none cavitated. We report the clinical case of a 51-year-old emphysematous smoker man with a peripheral intrapulmonary middle-lobe cavitating lipoma, revealed during a routine chest X-ray for emphysema, subsequently confirmed by high-resolution computed tomography (HRCT) and positron emission tomography (PET)–CT. Some hypotheses are made about the origin of cavitation. Biopsy and surgery were not done due to the fully benign nodular features at imaging. The nodule was unchanged till 2 years, last follow-up with low-dose HRCT. It is probably useful to choose a conservative approach with a follow-up, if there is a high suspicion of benignity.

Keywords

- computed tomography
- management
- positron emission tomography
- pulmonary lipoma

Introduction

A lipoma is a benign mesenchymal neoplasm composed of fatty tissue. Lipomas are the most common form of benign soft tissue tumors in humans and they infrequently occur in visceral organs, such as the lungs.[1,2] Pulmonary lipomas constitute approximately 0.1 to 1.3% of benign bronchial neoplasms.[2–5] They can occur as an endobronchial (80%) or as extremely uncommon (20%) peripheral parenchymal lesion.[2–7] From the literature review, less than 10 cases of lung peripheral lipoma have been reported in literature, none cavitated.[2–9] We report a unique case of peripheral pulmonary cavitated lipoma in a 51-year-old man which revealed during a routine chest X-ray for emphysema evaluation, confirmed by high-resolution computed tomography (HRCT) and with positron emission tomography (PET)/CT. We propose our imaging-guided management of this rare lesion.

Case Report

A 51-year-old man was referred to our Hospital Respiratory Clinic for a routine check-up due to history of emphysema. He was a 20-pack-year smoker and also affected by diabetes mellitus and hypertension. He was afebrile, normotensive, and normocardic; laboratory reports, including C-reactive protein, revealed normal blood count, and renal/liver function tests were also normal. Physical examination was significant only for sibilant wheezing rhonchus in the lungs and no other relevant abnormalities. Chest radiograph showed a nodular cavitated opacity in the right lung, close to the hilum (►**Fig. 1**). Chest HRCT confirmed centrilobular emphysema in the upper lung lobes and revealed a 3 cm × 2.6 cm round well-circumscribed nodule in the middle lung lobe without any fissural contact, with just thickened medial wall and thin lateral margin. The lesion had fat attenuation (i.e., −130 to −140 HU) and a central

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Fig. 1 Posteroanterior and lateral chest radiograph views show a well-defined rounded middle lobe cavitating nodular lesion (arrows).

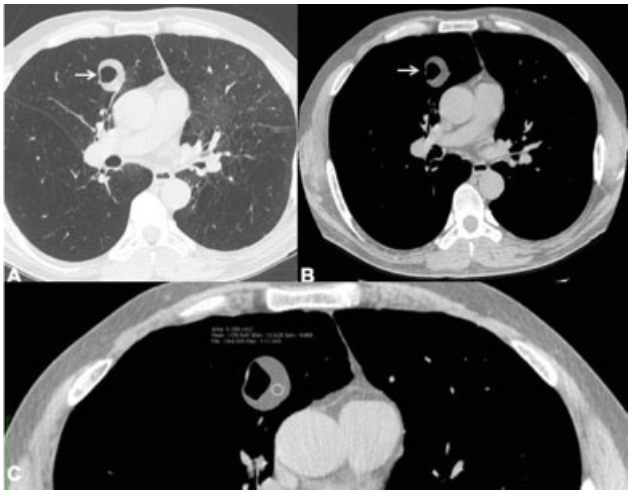

Fig. 2 High resolution CT axial images at (**A**) lung window and (**B**) mediastinal window confirm a well-defined, rounded centrally cavitated middle lobe (medial segment) lesion (arrows), measuring 3 cm × 2.6 cm in the maximum transverse dimension. (**C**) Lung nodule attenuation values are of 120 to 140 UH, clearly indicating the presence of fat. The lesion was highly suggestive of a peripheral cavitated lung lipoma. CT, computed tomography.

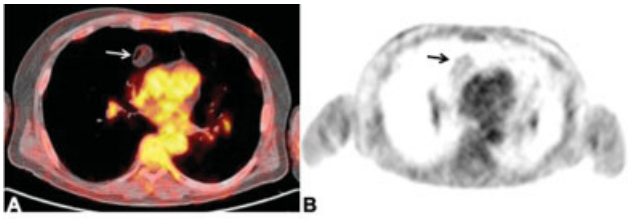

Fig. 3 A 18-F fluorodeoxyglucose positron emission tomography/computed tomography (18-F FDG PET–CT) examination shows a low grade of FDG uptake in the known middle lobe pulmonary nodule (SUV, Standardized uptake value max 1.1), confirming a benign lesion (arrows). CT, computed tomography; SUV, standardized uptake value.

inner thin-walled homogeneous air-density cavitation area, without debris and visible communication with the bronchial tree (►**Fig. 2**). No vessels, necrosis, air bronchogram, or calcification was present within nodule. Evaluation of the mediastinum revealed no adenopathy, and there were no features of malignancy. An 18-fluorodeoxyglucose PET/CT scan was subsequently performed and the nodule did not reveal an abnormal

Table 1 Main differential diagnosis of fat-containing lung nodule(s)

Fat-containing nodules of the lung	Imaging features	Specific features
Pulmonary hamartoma (soft tissue nodule or mass) most common benign lung lesion	Well-circumscribed round or ovoid up to 60% have fat, 20–30% have calcification fat and calcium, in 19%, cavitation not seen heterogeneous enhancement FDG PET variable avidity	Usually incidental and solitary lesion popcorn-like calcifications (multiple clumps throughout the lesion) endobronchial (3–20%) slow growth
Lipoma (peripheral lesions exceptionally rare)	Well-defined fat attenuation uncommonly calcification(s)	Typically solitary endobronchial and obstruction findings
Pleural or mediastinal lipoma	Homogeneous fat attenuation well-defined margins	pleural or mediastinal lesion Also fissural lesions
Myelolipoma (rare lesions)	Well-circumscribed fat and hematopoietic components generally as small nodules or <5 cm	Typically pleural-based rare calcifications slow or no growth
Lipoid pneumonia (oily or lipid components within pneumonia)	Low (fat) attenuation GGO areas or consolidation(s) rarely crazy-paving ossific foci may be present	Inflammatory chronic aspiration risk predilection for dependent lung Lung fibrosis possible
Metastatic disease: liposarcoma	Significant amounts of soft tissue within the fatty mass up to 5 cm lesion(s) FDG PET usually high uptake MRI characteristics	Usually extrathoracic mass history Histology needed
RCC	Lipid-rich cells clear cell RCC	Renal cancer history Histology needed

Abbreviations: FDG PET, fluorodeoxyglucose positron emission tomography; GGO, ground-glass opacity; RCC, renal cell carcinoma.

uptake (►**Fig. 3**). All imaging features suggested a benign lesion, and patient received a lipoma diagnosis. He was admitted to a 6-month and then annual low-dose HRCT surveillance without biopsy or surgical intervention. The nodule remains unchanged after 2 years of HRCT follow-up.

Discussion

Intrapulmonary lipomas are rare fat-containing benign lung lesions. There are different theories about their intrapulmonary origin. Endobronchial lipomas are usually surrounded by bronchial epithelium, probably arising from adipose tissue within proximal lobar or segmental bronchial wall.

The origin of peripherical lipomas can be from peribronchial or subpleural fat tissue. Clinical presentation differs according to the origin. Most peripheral lipomas are asymptomatic, with the majority being found incidentally on routine radiographs as solitary opacities, indistinguishable on plain films from malignant neoplasms.[2–9] Conversely, endobronchial ones can present with atelectasis, cough, fever, and pneumonia.[10] Risk factors are smoking, obesity, and diabetes mellitus.[1] The main commonest entity considered in the differential diagnosis of intrapulmonary nodules containing fat is hamartoma (►**Table 1**). Pulmonary hamartomas frequently have focal areas of fat (up to 60%) alternating with solid areas and typically dispersed popcorn calcifications (from 5 to 50%).[2,11] Magnetic resonance imaging (MRI) also enables the distinction of different lesion components, including fat. Fat within a lesion appears hyperintense on T1- and T2-weighted images and shows decreased signal intensity on fat-saturation techniques. Opposed phase gradient-echo MRI can show evenly distributed microscopic intralesional fat.[12]

The originality of the described lipoma is that it appears cavitated and features never described in the medical literature to our knowledge. A cavity is defined in the Fleischner glossary as "a gas-filled space, seen as a lucency or low-attenuation area, within pulmonary consolidation, a mass, or a nodule."[12] Many types of solitary pulmonary nodules may result in cavitation, so its presence or absence is of limited diagnostic value. In our case, the absence of debris and thickening of the cavitation wall excludes a suppurative, caseous, or ischemic necrosis. Conversely, it is possible to think to a nodular encasement of a panlobular emphysema/bulla area or of a cystic dilation of microscopic bronchial structure.

Conclusion

In conclusion, both CT and MRI can help to identify intranodular fat, and PET/CT may show a normal physiological uptake; all these are reliable indicator of benign nature, excluding the use of invasive procedures, such as pulmonary biopsy or surgery. Although rare, peripheral lung cavitated lipomas should be included in the differential of fat-containing lung lesions. A suggested image-guided management option includes watchful waiting (wait and see) with follow-up CT imaging.

Conflict of Interest
The authors declare that they have no conflict of interests with any constitutional government, and that no pharmaceutical or medical company was involved in this report.

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